

# Ecological Footprints

Material prepared by Bob Douglas for  
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## Background to the summer school

The ecological footprint is a well-validated measure of human impact on the earth's biologically active land and water. Australia's ecological footprint per capita is amongst the highest in the world at about 7 hectares per person. But there is only enough biologically active land and water available on planet Earth to sustain a population of about 7 billion people using about 1.8 ha per person.

The future is clearly in serious doubt. We are facing a brick wall of impossibility if we continue with "business as usual" as a nation and as a species. Developing countries currently have an ecological footprint ranging from 0.8 to 2.5 ha per person. These countries naturally aspire to increase their footprint and cannot possibly do so unless rich countries reduce theirs.

This workshop will examine the whole issue of footprints, how they are generated and the changes that could reduce them. One of the most important ways we can rapidly reduce the footprint is through drastic reduction of carbon dioxide emissions to zero. Humans are locked into a blatantly anthropocentric cultural existence, which takes the environment for granted and fails to build its values into our economic thinking. We will explore the implications of current footprints and their utility as a means of monitoring and motivating progress towards a sustainable, peaceful and more equitable world and taking meaningful action personally and collectively in our faith communities.

## **Ecological Footprint Basics – Overview**

Note: this paper draws heavily from (and much is directly pasted from)

[http://www.footprintnetwork.org/en/index.php/GFN/page/footprint\\_basics\\_overview/](http://www.footprintnetwork.org/en/index.php/GFN/page/footprint_basics_overview/)

<http://www.epa.vic.gov.au/ecologicalfootprint/calculators/default.asp>

Other important websites are shown where relevant

## Introduction

Humanity needs what nature provides, but how do we know how much we're using and how much we have left to use?

The Ecological Footprint has emerged as the world's premier measure of humanity's demand on nature. This accounting system tracks, on the demand side (Footprint), how much land and water area a human population uses to provide all it takes from nature. This includes the areas for producing the resource it consumes, the space for accommodating its buildings and roads, and the ecosystems for absorbing its waste emissions such as carbon dioxide. These calculations account for each year's prevailing technology, as productivity and technological efficiency change from year to year. The accounting system also tracks the supply of nature: it documents how much biologically productive area is available to provide these services (biocapacity). Therefore, these accounts are able to compare human demand against nature's supply of biocapacity. Our current global situation: *Since the 1970s, humanity has been in ecological overshoot with annual demand on resources exceeding what Earth can regenerate each year.*

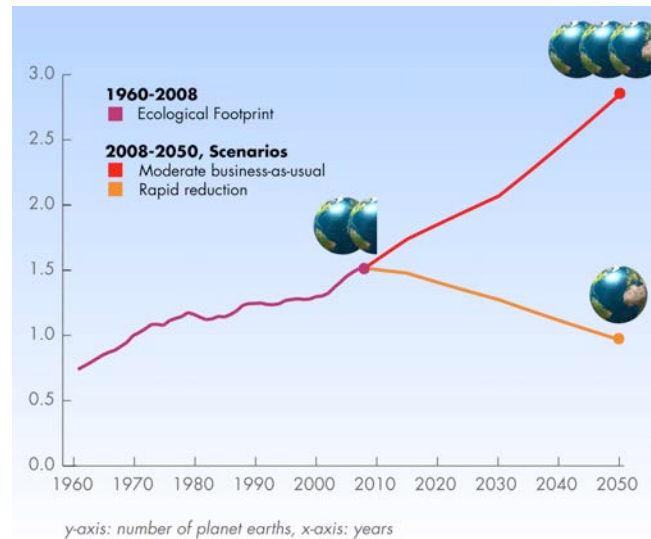
It now takes the Earth one year and six months to regenerate what we use in a year. We maintain this overshoot by liquidating the Earth's resources. Overshoot is a vastly underestimated threat to human well-being and the health of the planet, and one that is not adequately addressed. By

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measuring the Footprint of a population—an individual, city, business, nation, or all of humanity—we can assess our pressure on the planet, which helps us manage our ecological assets more wisely and take personal and collective action in support of a world where humanity lives within the Earth's bounds.

Conceived in 1990 by Mathis Wackernagel and William Rees at the University of British Columbia, the Ecological Footprint is now in wide use by scientists, businesses, governments, agencies, individuals, and institutions working to monitor ecological resource use and advance sustainable development.



Today humanity uses the equivalent of 1.5 planets to provide the resources we use and absorb our waste. This means it now takes the Earth one year and six months to regenerate what we use in a year. Moderate UN scenarios suggest that if current population and consumption trends continue, by the 2030s, we will need the equivalent of two Earths to support us. And of course, we only have one. Turning resources into waste faster than waste can be turned back into resources puts us in global ecological overshoot, depleting the very resources on which human life and biodiversity depend. The result is collapsing fisheries, diminishing forest cover, depletion of fresh water systems, and the build up of carbon dioxide emissions, which creates problems like global climate change. These are just a few of the most noticeable effects of overshoot. Overshoot also contributes to resource conflicts and wars, mass migrations, famine, disease and other human tragedies—and tends to have a disproportionate impact on the poor, who cannot buy their way out of the problem by getting resources from somewhere else.

The Earth provides all that we need to live and thrive. So what will it take for humanity to live within the means of one planet? Individuals and institutions worldwide must begin to recognize ecological limits. We must begin to make ecological limits central to our decision-making and use human ingenuity to find new ways to live, within the Earth's bounds. This means investing in technology and infrastructure that will allow us to operate in a resource-constrained world. It means taking individual action, and creating the public demand for businesses and policy makers to participate.

Using tools like the Ecological Footprint to manage our ecological assets is essential for humanity's survival and success. Knowing how much nature we have, how much we use, and who uses what is the first step, and will allow us to track our progress as we work toward our goal of sustainable, one-planet living. \*See the Ecological Footprint Atlas for more information.

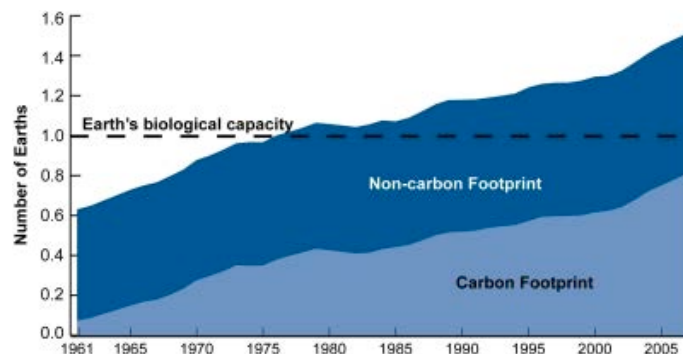
## Carbon Footprint

Today, the term “carbon footprint” is often used as shorthand for the amount of carbon (usually in tonnes) being emitted by an activity or organization. The carbon component of the Ecological Footprint takes a slightly differing approach, translating the amount of carbon dioxide into the amount of productive land and sea area required to sequester carbon dioxide emissions. This tells us the demand on the planet that results from burning fossil fuels. Measuring it in this way offers a few key advantages.

On a practical level, the Ecological Footprint shows us how carbon emissions compare and interact with other elements of human demand, such as our pressure on food sources, the quantity of living resources required to make the goods we consume, and the amount of land we take out of production when we pave it over to build cities and roads. The carbon Footprint is 54 percent of humanity’s overall Ecological Footprint and its most rapidly-growing component. Humanity’s carbon footprint has increased 11-fold since 1961. ***Reducing humanity’s carbon Footprint is the most essential step we can take to end overshoot and live within the means of our planet.*** The Footprint framework enables us to address the problem in a comprehensive way, one that does not simply shift the burden from one natural system to another.

## The Ecological Footprint and Climate Change

The Footprint framework also shows climate change in a broader context—one which unites all of the ecological threats we face today. Climate change, deforestation, overgrazing, fisheries collapse, food insecurity and the rapid extinction of species are all part of a single, over-arching problem: Humanity is simply demanding more from the Earth than it can provide. By focusing on the single issue, we can address all of its symptoms, rather than solving one problem at the cost of another. At Global Footprint Network, our work is focused on helping nations – and by extension, humanity as a whole—succeed in a world of emerging resource constraints. We do so by giving leaders the data they need to make decisions that are aligned with ecological reality. In this way, we can begin to move away from the emissions and resource-intensive economies of the past and toward those that can thrive within the limits of what nature can provide.



## Methodology Overview

The Global Footprint Network calculates both the Ecological Footprint, (the demand on nature), and biocapacity, (the capacity to meet this demand), for more than 230 countries, territories, and regions; approximately 150 are covered consistently by the source data sets and reported. The results, updated annually, as well as the calculations are shown in the National Footprint Accounts. The 2011 National Footprint Accounts use over 6,000 data points for each country, each year, derived from internationally recognized sources (see data sources, below) to determine the area required to produce the biological resources a country uses and to absorb its wastes, and to compare this with the area available. This area is reported in global hectares (global acres), hectares (acres) with world-average productivity, for each year from 1961 through 2008.

The Ecological Footprint uses yields of primary products (from cropland, forest, grazing land and fisheries) to calculate the area necessary to support a given activity. Biocapacity is measured by calculating the amount of biologically productive land and sea area available to provide the resources a population consumes and to absorb its wastes, given current technology and management practices. Countries differ in the productivity of their ecosystems, and this is reflected in the accounts.

A nation's consumption is calculated by adding imports to and subtracting exports from its national production. Results from this analysis shed light on a country's ecological impact. For example, the 2011 National Footprint Accounts identify whether or not a country's Ecological Footprint exceeds its biocapacity. A country has an ecological reserve if its Footprint is smaller than its biocapacity; otherwise it is operating with an ecological deficit. The former are often referred to as ecological creditors, and the latter ecological debtors. Today, most countries, and the world as a whole, are running ecological deficits. The world's ecological deficit is referred to as global ecological overshoot.

## **Data Sources**

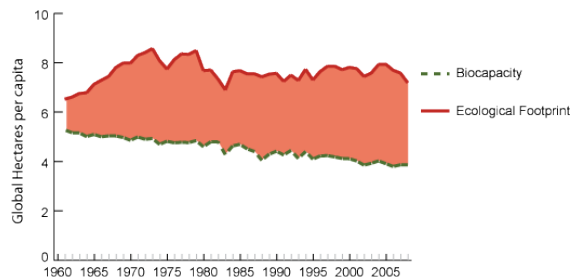
The calculations in the National Footprint Accounts are primarily based on international data sets published by the Food and Agriculture Organization of the United Nations, United Nations Commodity Trade Statistics Database and other data from the UN Statistics Division, the International Energy Agency, and the Intergovernmental Panel on Climate Change. Other data sources include studies in peer-reviewed science journals and thematic collections. Of the more than 230 countries, territories, and regions analyzed in the National Footprint Accounts, 150 had populations over one million and were covered consistently by the United Nations statistical system.

## **National per capita Footprint and Biocapacity Analyses**

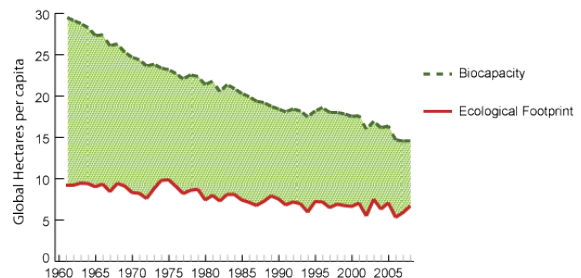
**(Points to note in these national profiles of PER CAPITA footprints and biocapacity).**

1. United States, with a very high per capita footprint (approx 7 gha per person) has exceeded its national biocapacity, which is continuing to decline for the past forty years.
2. Australia has nearly as high a per capita footprint as the US ( nearing 7 hectares per person) but as a nation, we still have greater biocapacity than we are using, though it is declining drastically. (Other nations are using and depending on it)
3. Bangladesh has a very low per capita footprint ( about 0.6 hectares per person) which is rising increasingly beyond the nation's biocapacity, placing it into greater ecological deficit.
4. China's per capita footprint is rising dramatically above about 2.2 hectares per person), placing it in greater and greater ecological deficit.

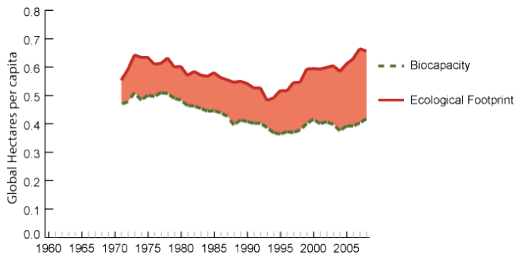
### **1. United States**



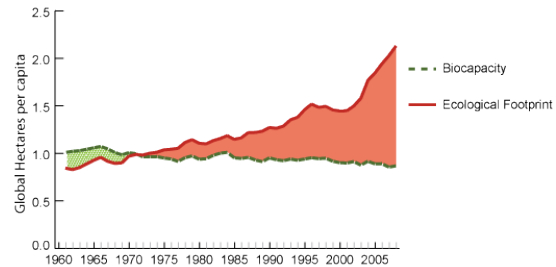
### **2. Australia**



### 3. Bangladesh



### 4. China



### Global Equity of access to world resources

- For the 15% of the world population who live in high-income countries the average footprint is 6.4 global hectares per person.
- For the 48% of the world's population who live in medium-income countries, the average footprint is 1.9 global hectares per person.
- For the 37% of the world's population who live in low-income countries the average footprint is 0.8 global hectares per person.

### Ecological Footprint Calculators

<http://www.epa.vic.gov.au/ecologicalfootprint/calculators/default.asp>

The Ecological Footprint calculators have a number of functions and roles. Depending on how detailed and accurate an estimation you want, you can spend anything between ten minutes and several hours calculating your Ecological Footprint.

The challenge that each of the calculators helps you with is to live and work more sustainably by setting targets for achieving Ecological Footprint savings - both directly through your own behaviour and indirectly through other peoples' or organisations' behaviours that you can influence. You might well find that you even save money (increasing the household or school budget, business profitability or reducing event costs) and improve your quality of life, by examining your Ecological Footprint and undertaking actions to reduce it. As measurement tools, the calculators also help you to compare the impacts that different activities or everyday decisions might have, whether they take place in your home, in your school or office, or in managing an event.

Before you start to calculate the Ecological Footprint of your self, home, office, school, retail or event, decide what it is that you want to measure. For example, if you work from home, you may not want to include your work Footprint in your home Footprint, or vice versa. Once you have decided, you can calculate the Ecological Footprint using the following calculators:

- Personal
- School
- Retail tenants
- Retail centre
- Event

In addition to calculating your Ecological Footprint, you can also calculate your greenhouse gas emissions and the impact of your car.



## Background on calculators

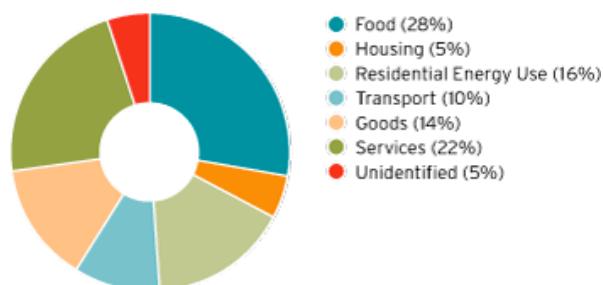
The Personal, Home, School, Office and Event Calculators use both life cycle data of individual consumption items and national Australian Bureau of Statistics data on Australian consumption patterns. These calculators were updated and enhanced in 2006 by the National Centre for Sustainability at Swinburne University (Victoria, Australia) and the Centre for Design at RMIT University, who also then jointly developed the Event Calculator. The Retail Calculator was developed in 2006 through a partnership between EPA Victoria, The GPT Group, Lend Lease Retail and the Global Footprint Network. In 2007 EPA worked with Global Footprint Network and WWF Australia to develop a new version of the Personal calculator. This fun and engaging tool is designed to help people calculate their own environmental impact.

## Australia's and Victoria's Ecological Footprint

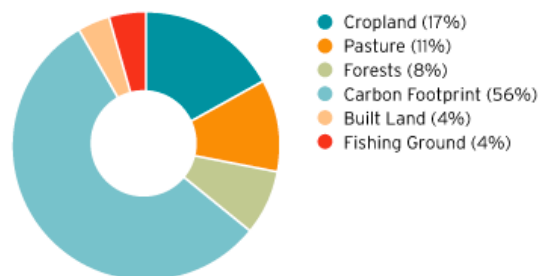
The most significant factor contributing to the Australian Ecological Footprint is *carbon dioxide emissions from fossil fuels* (constituting approximately half of the total Australian Footprint). <sup>1</sup> A global hectare refers to one hectare (approximately soccer field size) of biologically productive space with world-average productivity.

The average Victorian needs 6.8 global hectares of land to sustain his or her lifestyle. If everyone on the planet lived like Victorians, we would need more than four Earths to support us. Victoria's Footprint is slightly larger compared to Australia's (6.6 gha per person). While the main pattern of consumption in Victoria is similar to the national average, there is a notable difference in the area of *residential energy use* (mainly due to Victoria's reliance on electricity from carbon dioxide intensive brown coal-fired power stations). Like the rest of Australia, Victorians' Footprint is large because they generally live in large cities, in relatively large houses, travel long distances, and their energy needs are currently sourced primarily from fossil fuels.

## Break down of Victoria's Footprint (note particularly the contribution of food)



Victoria's Ecological Footprint by consumption category



Victoria's Ecological Footprint by land type

## The ACF Consumption Atlas

<http://202.60.88.196/consumptionatlas/>

This is a magnificent online tool, which has been compiled at The University of Sydney for the Australian Conservation Foundation based on ABS household expenditure data for postcodes across Australia. The online consumption atlas encourages individuals to personalise the consumption by locating where they live on the map and choosing an indicator (greenhouse gas emissions, water use or ecological footprint) to discover their community consumption rate showing them how they compare nationally. Methods are offered to help people reduce their overall consumption and therefore their personal footprint.

## **Humanity's challenge in terms of footprint thinking.**

The defining challenge of our age (which encompasses addressing climate change and extreme poverty) is NOT for the more than 7 billion people to be sustained on a Weston industrial model of development. It IS how to sustain the projected global population at an adequate standard of living for all within the regenerative bio capacity of one planet.

Overshoot can be eliminated on the DEMAND side by reducing humanity's footprint. This can happen through the lowering of world population, through reducing per capita consumption and through implementing more resource efficient technologies for providing goods and services.

Overshoot can be eliminated on the SUPPLY side by increasing global bio-capacity which can come about through expanding global bio productive areas, improving resource management and strengthening ecosystems health.

<http://www.epa.vic.gov.au/ecologicalfootprint/docs/sharon-edes-presentation.pdf>

## **Actions for reducing our personal and collective ecological footprint.**

<http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/TipsforImprovement.asp>

### **Rethinking your diet**

- Eating is a basic human need. Different food products require different amounts of resources to be produced. To learn more about how the different foods you eat impact on your footprint, visit [www.cspinet.org/EatingGreen/score.html](http://www.cspinet.org/EatingGreen/score.html)

### **Flying less, off-setting**

- If you fly one domestic return flight less in Australia, you can save up to one tonne of greenhouse gases (total fuel and embodied energy required per person flight). So, take fewer flights, and offset your carbon emissions. A couple of options for off-setting are [www.climatefriendly.com.au/](http://www.climatefriendly.com.au/) and [www.climatecare.org/](http://www.climatecare.org/)

### **Alternatives to using a car**

- Choose public transport, walk or ride a bike when you can. Minimise car journeys by planning ahead to run several errands in the one trip. Per person, bus travel generates only 9% and rail travel only 6% of the greenhouse pollution of travelling alone by car. For every litre of petrol you save, you reduce 2.9 kg of greenhouse gas emissions.

### **Reducing water consumption**

- Take shorter showers, only run appliances like dishwashers when they are full, and install water saving devices or a rain tank for watering the garden.

### **Reducing energy consumption**

- Switch off lights and computers and turn off appliances that use standby mode. Ensure the seals on your fridge work properly. Ask your energy company if they sell power generated from renewable energy sources (if in Australia, see [www.greenpower.com.au](http://www.greenpower.com.au) for a list of accredited products).

### **Installing energy efficient appliances and fixtures**

- Check the labels for energy efficiency rating when you are purchasing appliances. Use energy efficient light globes in your home and office.

### **Shopping with care**

- Take your own bags when you go shopping and choose products with minimal and recycled/recyclable packaging. Buy local fruit and vegetables to reduce the transport distance of food you consume. Grow your own fruit and vegetables.

### **Taking action**

- Help businesses and governments to reduce our ecological deficit, tracking progress with measures like the Ecological Footprint.



## **Greening the Church**

<http://www.united-church.ca/communications/news/releases/080416>

This is a recently published “how-to” guide for United Church of Canada congregations that want to make a difference. It suggests ways to make church buildings more energy efficient and ecologically sustainable. The term “ecological footprint” usually describes the impact of human activity on the environment. Measuring a church building’s ecological footprint refers not only to the energy required to heat and cool the building, but also to the use of water, electricity, appliances, equipment, and lighting. A church’s ecological footprint can also be measured by the types of products the church uses and the sources of those materials. It includes the land on which the church building and parking lot sit, and extends to church lawns and gardens. Going green is no small challenge for many congregations, especially if their buildings were constructed in an era when energy costs were lower and few people were aware of the effects of greenhouse gases. And as many churches are historic buildings, significantly altering them—structurally or cosmetically—can be difficult or even impossible.

## **Concluding comment**

The ecological footprint is an extremely valuable tool both to help to understand the nature of the developing crisis and to identify areas for action. It is important to note that different calculators arrive at their approximation of the ecological footprint in different ways and make different assumptions. You will find therefore differing estimates of the Australian ecological footprint depending on the method of calculation used. What is absolutely robust is scientific concept and the evidence that Australia’s footprint is amongst the highest in the world and that humanity’s ecological footprint is radically outstripping the Earth’s capacity to cope.